

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 08 MAR 2005

WIPO PCT

Applicant's or agent's file reference LU6058/CB	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/4-16)	
International application No. PCT/EP 03/11585	International filing date (day/month/year) 18.10.2003	Priority date (day/month/year) 22.10.2002
International Patent Classification (IPC) or both national classification and IPC C07C22/04		
Applicant BASELL POLYOLEFINE GMBH et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 15.04.2004	Date of completion of this report 07.03.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Goetz, G Telephone No. +49 89 2399-8105



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP 03/11585

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-12 as originally filed

Claims, Numbers

1-3 received on 12.10.2004 with letter of 12.10.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP 03/11585

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-3
	No: Claims	
Inventive step (IS)	Yes: Claims	1-3
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-3
	No: Claims	

2. Citations and explanations

see separate sheet

- D1: P. WITTE ET AL.: "Synthesis of unbridged Bis(2-R-indenyl)zirconocenes containing functional groups and investigations in propylene polymerization" ORGANOMETALLICS, vol. 18, 1999, pages 4147-4155, XP002270401
- D2: DATABASE CROSSFIRE BEILSTEIN [Online] Beilstein Institut zur Förderung der Chemischen Wissenschaften, Frankfurt am Main, DE; XP002270402
retrieved from XFIRE Database accession no. brn 6314119

1. The process for preparing compounds according to formula (I) according to present claim 1 is in particular characterized by the use of compound (II) as starting material. Present claim 2 is directed to compound (II) per se.
Present claim 3 is directed to the use of compound (II) in preparing compounds according to formula (I) of claim 1.
2. Novelty of claim 2 is given since none of the available prior art documents cited in the search report and in the description of present application discloses the compound of formula (II). In particular the compound of formula (II) as claimed in claim 2 differs from the compound disclosed in D1 by the replacement of the bromine-atoms by chlorine atoms and from the indene disclosed in D2 (see scheme 1) by the fact that in D2 the phenyl-ring of the indene compound is not further substituted.
Since the compound (II) is novel and since the process of present claim 1 uses this novel compound as reactant novelty of the claimed process is given as well.
The subject matter of present claims 1 to 3 is thus novel over D1 as well as D2 (PCT Article 33.2).
3. In view of D1 which can be regarded as representing the closest prior art the underlying problem can be defined by the provision of further compounds which can be used as educts/reactants in the preparation of 2-alkyl-4(or 7)-arylindenes as well as by the provision of a process for preparing 2-alkyl-4(or 7)-arylindenes using these novel starting compounds.
The solution is seen in the provision of a process as claimed in claim 1 whereby this process uses compounds according to formula (II) of present claim 2 as reactants.
Due to this process, which is in particular characterized by the use of the compound of claim 2, the preparation of arylindenes which are substituted in the 4- or 7-position

is easier and avoids a time-consuming preparation procedure since the substituent is present already in the indene-compound. This advantage is not evident from D1 since in D1 the indenenes have no substituent in the phenyl-ring. This advantage is in addition not evident from the prior art cited in the description.

Since no hint can be found in the available prior art the subject matter of present claims 1 to 3 is considered to be based on an inventive step (PCT Article 33.3).

4. The industrial applicability is given for all claims (PCT Article 33.4).
5. The scope of the description and the examples is broader than the scope of present claims 1 to 3 (PCT Article 6).

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new set of claims

1. A process for preparing substituted indenenes of the formula (I)



10 and their double bond isomers of the formula (Ia)



which comprises converting a compound of the formula (II)



into a bisorganometallic compound of the formula (III)

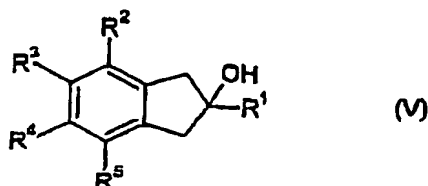


and reacting this with a compound of the formula (IV)

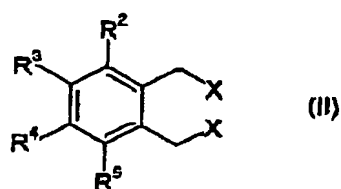


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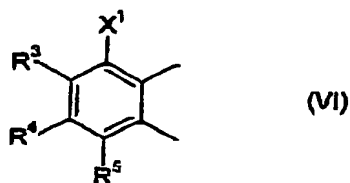
to give an indanol of the formula (V)



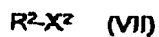
and converting this into an indene of the formula (I) or (Ia) by elimination of water, wherein the compound of the formula (II)



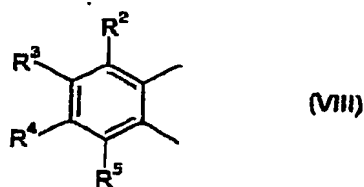
is prepared by coupling of a compound of the formula (VI)



with a compound of the formula (VII)



in the presence of a transition metal catalyst, with either the compound of the formula (VI) or the compound of the formula (VII) firstly being converted into a corresponding organo-metallic compound, and the coupling product of the formula (VIII)



is reacted with a halogenating agent to give a compound of the formula (II),

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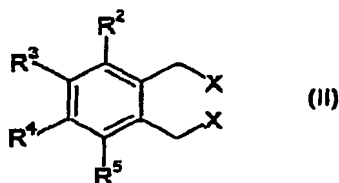
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where

 R^1 is a linear, branched or cyclic C_1 - C_{10} -alkyl radical, R^2 is a substituted or unsubstituted C_6 - C_{10} -aryl radical selected from the group consisting of phenyl, 1-naphthyl, phenanthryl, 3-tert-butylphenyl, 4-tert-butylphenyl, 3,5-di(tert-butyl)phenyl, 4,4'-biphenyl and 3,5-di(phenyl)phenyl, R^3 - R^5 are each hydrogen, X is a chlorine atom, M is magnesium monochloride and Y is OR^6 , where R^6 is a linear, branched or cyclic C_1 - C_{10} -alkyl radical

2. A compound of the formula (II)

20 where R^2 , R^3 , R^4 , R^5 and X are as defined in claim 1.

3. The use of a compound of the formula (II) as claimed in claim 2 as starting material for the synthesis of substituted indenenes of formula (I) or (Ia) as defined in claim 1.